

12

EUROPEAN PATENT APPLICATION

21 Application number: 83301400.4

51 Int. Cl.³: **H 01 R 17/12**

22 Date of filing: 15.03.83

30 Priority: 31.03.82 US 364101

71 Applicant: **AMP INCORPORATED**, Eisenhower Boulevard, Harrisburg Pennsylvania (US)

43 Date of publication of application: 05.10.83
Bulletin 83/40

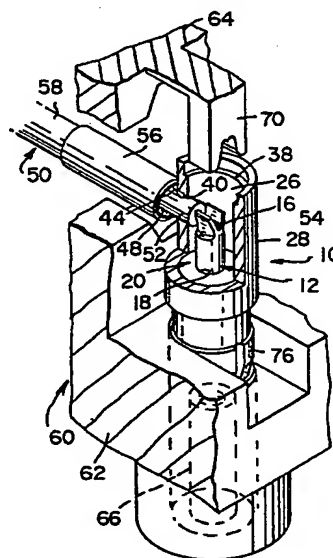
72 Inventor: **Forney, Edgar Wilmot, Jr.**, 4336 Crest View Road, Harrisburg Pennsylvania 17112 (US)
Inventor: **Ringley, Donald Bruce**, 510 North 36th Street, Harrisburg Pennsylvania 17109 (US)

84 Designated Contracting States: BE DE FR GB IT NL SE

74 Representative: **Wayte, Dennis Travers et al**, 20 Queensmere, Slough, Berkshire SL1 1YZ (GB)

54 Right angle coaxial connector.

57 A right angle coaxial connector comprises a metal body member (28) having a dielectric member (20) secured along a passageway (26) extending through the body member (28). A center contact member (12) is secured in the dielectric member (20) and includes a contact section (14) and a U-shaped ferrule section (16); the contact section (14) is adapted to nest in a contact-receiving die (66) of a crimping tool (60) and the ferrule section (16) is in alignment with an open end of the body member (28) permitting access by a crimping die (70) of the crimping tool (60) to crimp the U-shaped ferrule section (16) onto a center conductor (54) of a coaxial cable (50) while simultaneously crimping a crimping ferrule (56) of an outer conductor (48) of the coaxial cable (50) onto a tubular member (44) at right angles to the body member (28) and in alignment with the ferrule section (16).



EP 0 090 538 A2

RIGHT ANGLE COAXIAL CONNECTOR

This invention relates to electrical connectors and more particularly to right angle coaxial connectors.

The connection of the center contact member of a coaxial connector to a center conductor of a coaxial cable and the ease of making such connection to provide effective and reliable connections at low applied cost are important factors when coaxial terminations are made to right angle coaxial connectors.

The center conductor of a right angle coaxial cable as disclosed in U.S. Patent No. 3,047,828 is connected to the center contact by means of a slot in the center contact in which an exposed end of the center conductor is disposed whereafter the center conductor can be soldered to the center contact. A similar arrangement is disclosed in the right angle coaxial connector of U.S. Patent No. 2,335,041 with the inner end of a center pin contact being disposed in a slot in the inner end of a center receptacle contact. Access openings are provided in the connector housings to solder the center conductors to the center contacts if desired.

According to the present invention, a right angle coaxial connector comprises a metal body member having a dielectric member secured along a passageway extending through the body member. A center contact member is secured in the dielectric member and includes a contact section and a U-shaped ferrule section; the contact section is adapted to nest in a contact-receiving die of a crimping tool and the ferrule section is in alignment with an open end of the body member permitting access by a crimping die of the crimping tool to crimp the U-shaped ferrule section onto a center conductor of a coaxial cable while simultaneously crimping an

outer conductor of the coaxial cable onto a tubular member at right angles to the body member and in alignment with the ferrule section.

FIGURE 1 is an exposed perspective view of the right angle coaxial connector partly broken away, a stripped end of a coaxial cable and ferrule member.

FIGURE 2 is a view similar to Figure 1 with the coaxial cable in position in the coaxial connector ready for termination and the coaxial connector in position in a crimping tool which is shown in part cross section.

FIGURE 3 is a cross-sectional view of Figure 2 showing the tool in a crimping position.

FIGURE 4 is a perspective view of a completely terminated coaxial connector.

FIGURE 5 is a cross-sectional view of Figure 4.

FIGURE 6 is a part cross-sectional view of a receptacle section of a center contact in position in the contact-receiving die of the crimping tool for supporting the center contact during the crimping operation.

Figures 1 through 5 illustrate a right angle coaxial connector 10 which includes a center contact 12 having a pin section 14 and a U-shaped ferrule section 16. Center contact 12 is secured in a bore 18 of a dielectric member 20 by means of an annular barb 22.

Dielectric member 20 includes a large diameter section 24 which fits into passageway 26 of metal body member 28. Passageway 26 necks down into a smaller diameter section 30 in which a small diameter section 32 of dielectric member 20 is positioned with annular shoulder 24 forming a stop against which large diameter section 24 of dielectric member 20 engages thereby limiting the inner movement of dielectric member 20 within body member 28. Indentations 36 are formed in body member 28 containing section 32 of dielectric member 20 to secure dielectric member 20 in position in body member 28.

Ferrule section 16 is centrally aligned with respect to passageway 26 and is accessible through the open end thereof which contains an annular shoulder 38. Ferrule section 16 is also in alignment with an opening 40 in body member 28 which has an annular shoulder 42 against which tubular member 44 engages. Tubular member 44 is secured in opening 40 of body

member 28 by soldering, brazing, or the like, and it has annular grooves 46 in its exterior surface along which braided outer conductor 48 of a stripped end of coaxial cable 50 is disposed while inner insulation sheath 52 surrounding center conductor 54 is positioned within tubular member 44 with center conductor 54 being positioned within U-shaped ferrule section 16.

The legs of U-shaped crimping section 16 extend away from the axis of center contact 12 to facilitate positioning of the end of center conductor 54 therein.

A crimping ferrule 56 has been positioned on insulating jacket 58 of coaxial cable 50 prior to the stripped end of coaxial cable 50 being positioned in tubular member 44 and after braided outer conductor 48 has been positioned along the exterior surface of tubular member 44, crimping ferrule 56 is positioned onto tubular member 44 covering braided outer conductor 48 and extending partly along insulating jacket 58 so as to be crimped thereon as discussed in greater detail hereinafter.

As shown in Figures 2 and 3, a crimping tool 60 includes crimping dies 62, 64 with electrical connector 10 in position in a crimping area of crimping die 62 such that pin section 14 is positioned within a tubular member 66 with shoulder 68 of contact 12 abutting the upper surface of tubular member 66 to provide support to contact 12 when crimping member 70 of crimping die 64 moves into the opening of body member 28 to crimp the legs of U-shaped ferrule section 16 by folding them onto center conductor 54 thereby electrically and mechanically connecting center conductor 54 to center contact 12 as illustrated in Figure 3. Simultaneous with the crimping of ferrule section 16 into electrical connection with center conductor 54, crimping dies 62, 64 also crimp crimping ferrule 56 onto tubular member 44 and insulating jacket 58 to electrically connect braided outer conductor 48 to tubular member 44 thereby forming an excellent electrical and mechanical connection for the outer conductor to coaxial connector 10. The crimping of ferrule 56 onto insulating jacket 58 provides strain relief for the termination. The crimped configuration of ferrule 56 onto tubular member 44 and insulating jacket 58 is a hex configuration but can be circular or other configurations to accomplish the intended result. After coaxial cable 50 has been terminated to coaxial

connector 10 as illustrated in Figures 3 and 5, a closure member 72 is forcefully positioned in the opening of body member 28 in engagement with shoulder 38 to close the open end of passageway 26 as illustrated in Figures 4 and 5.

A tined front end 74 is clinched onto the front end of body member 28 surrounding pin section 14 to make electrical connection with a matable coaxial connector (not shown) to make electrical connection therewith. A retaining ring 76 is secured on body member 28 between front end 74 and shoulder 78 to secure coaxial connector 10 in position in a passageway of a connector housing if desired.

Figure 6 illustrates crimping die 80 which is similar to crimping die 62 but it contains a supporting member 82 onto which receptacle section 84 of center contact 12 is positioned when right angle coaxial connector 10 is positioned in crimping die 80 so that the inner surface 86 of center contact 12 abuts against the end of supporting member 82 to support center contact 12 when ferrule section 16 is crimped onto center conductor 54 in the manner as disclosed hereinbefore.

The center contact of the right angle coaxial connector of the present invention is a straight screw machine contact rather than a bent contact or multiple contact members, the U-shaped ferrule section enables the center conductor of the coaxial cable to be crimped onto the center conductor and the outer conductor of the coaxial cable to be crimped onto the coaxial connector thereby enabling the coaxial cable to be readily terminated to the coaxial connector at reduced applied costs to form excellent mechanical and electrical connections.

CLAIMS:

1. A right angle coaxial connector of the type comprising a metal body member (28) having a passageway (26) therethrough in which is secured a dielectric member (20) carrying a center contact member (12), an opening (40) in the body member (28) having a tubular member (44) secured therein at right angles with respect to the passageway (26) and in alignment with a connection section (16) of the center contact member (12), a stripped end of a coaxial cable (50) is adapted to be positioned within the tubular member (44), characterised in that

the connection section (16) of said center contact member (12) comprises a crimping-ferrule section (16) in which the center conductor (54) of the coaxial cable (50) is to be positioned and the outer conductor (48) of the coaxial cable (50) is to be disposed along an outside surface of said tubular member (44) with a crimping ferrule (56) positioned thereover so that said crimping-ferrule section (16) and said crimping ferrule (56) are respectively crimped onto the center conductor (54) and the tubular member (44) with the outer conductor (48) crimped between the tubular member (44) and the crimping ferrule (56).

2. A right angle coaxial connector as set forth in claim 1 characterised in that said center contact member (12) includes a surface (68, 86) for engagement with a supporting member (66, 82) of a crimping tool (60) for supporting said center contact member (12) when said crimping-ferrule section (16) is crimped onto the center conductor (54).

3. A right angle coaxial connector as set forth in claim 1 characterised in that said ferrule crimping section (16) and said crimping ferrule (56) are crimped simultaneously.

4. A method of connecting the center conductor (54) and outer conductor (48) of a coaxial cable (50) to the center contact member (12) and outer contact member (28, 44) of a right angle coaxial connector (10), characterised by the steps of:

positioning an insulation sheath (52) carrying the center conductor (54) of the coaxial cable (50) into a tubular member (44) in right angle alignment with a U-shaped crimping-ferrule section (16) of the center contact member (12) with an end of the center conductor (54) being disposed within the legs of the crimping-ferrule section (16) and the outer

conductor (48) extending along an exterior surface of said tubular member (44);

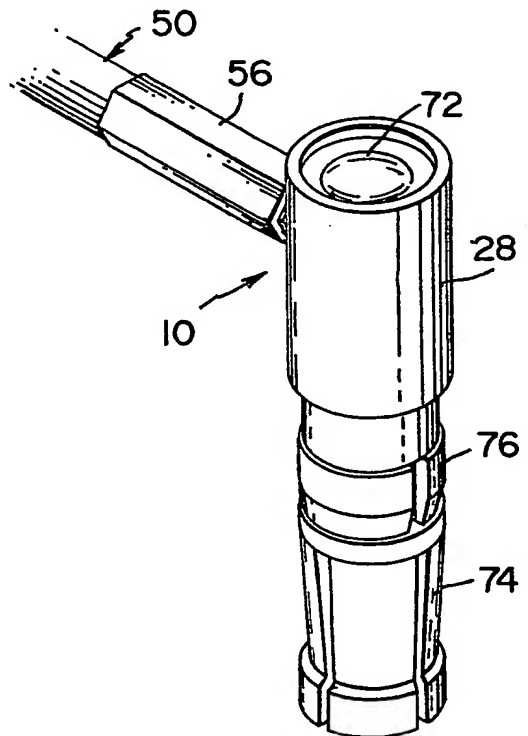
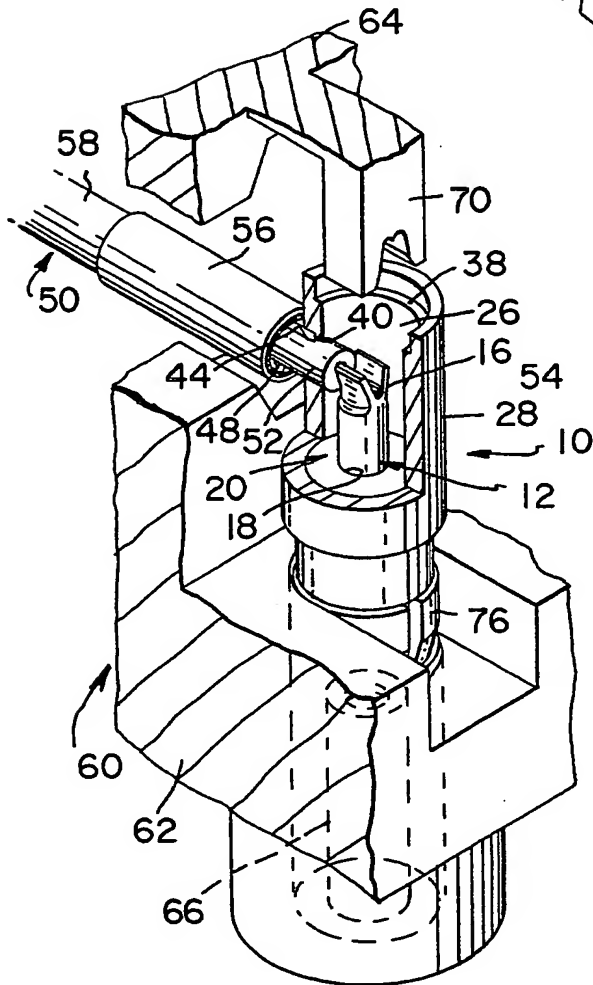
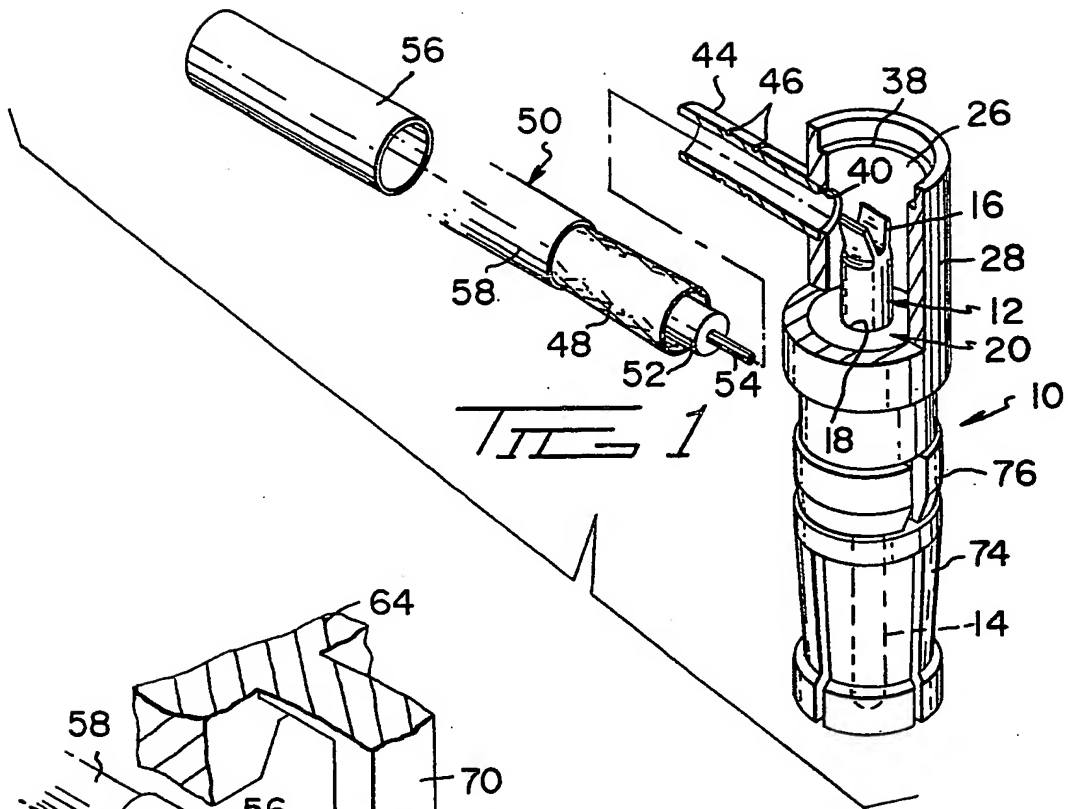
placing a crimping ferrule (56) onto said tubular member (44) with the outer conductor (48) disposed therebetween;

crimping said crimping-ferrule section (16) through an open end of the outer conductor (28) causing said legs to be moved into electrical connection with the center conductor (54) while supporting the center contact member (12); and

crimping said crimping ferrule (56) onto said tubular member (44) thereby electrically connecting the outer conductor (48) to the outer contact member (28, 44).

5. A method according to claim 4 characterised in that the crimping of the crimping-ferrule section (16) and the crimping ferrule (56) takes place simultaneously.

6. A method according to claim 4 characterised by the further step of securing a cap member (72) in the open end of the outer contact (28, 44) thereby sealing the open end.



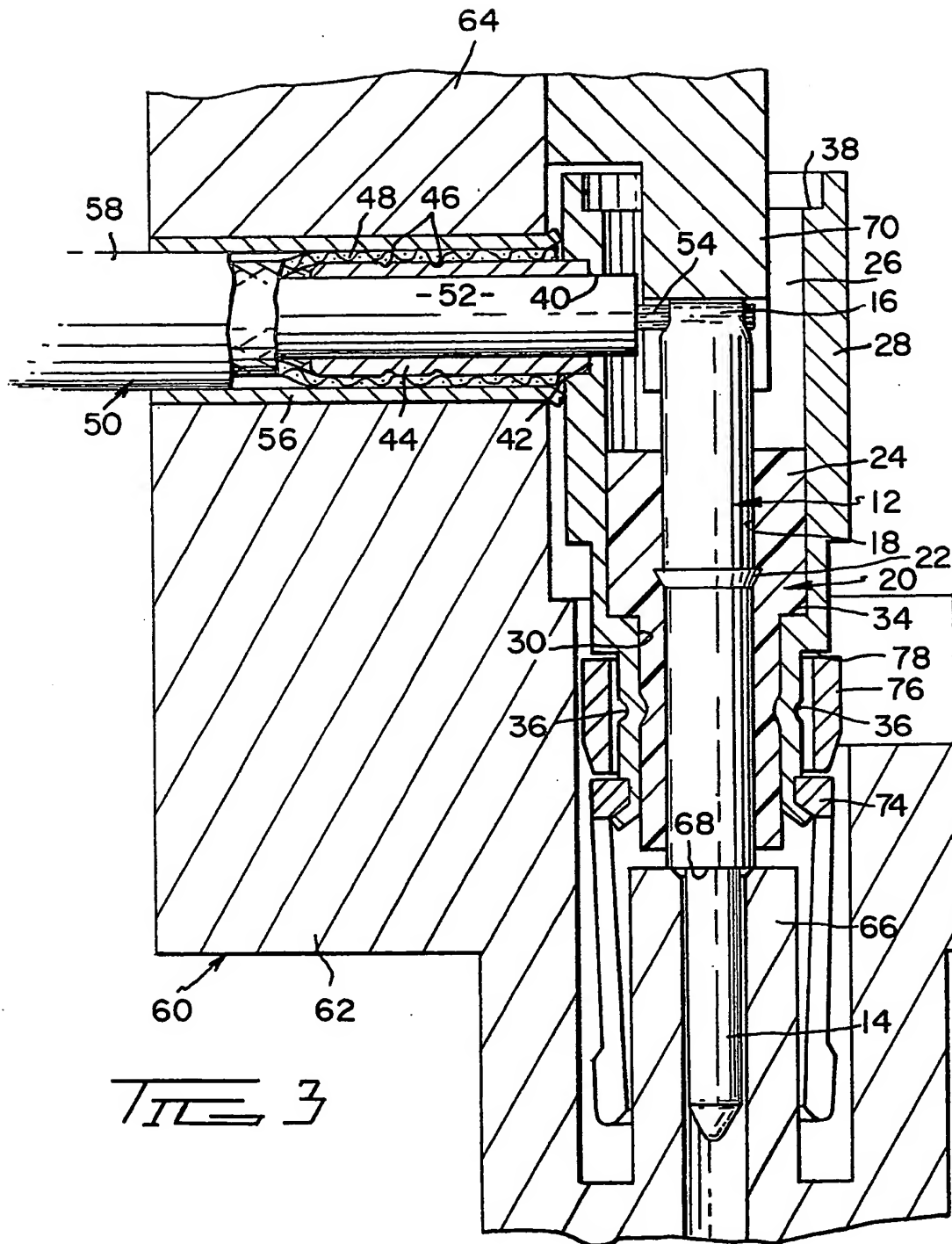


FIG 3

